

# 2

## Food and nutrition



In this unit you will find out the answers to these questions:

- Which organisms have to feed themselves? Do plants do this?
- Does everyone need to eat the same amount and type of **food**? Give reasons for your answer.
- Do you think **water** is a food?
- Why is it important to read the label on a product? Do you often do this?
- What do you think about slimming **diets**?

Before you start, check you understand the meaning of the words in blue.



### KEY WORDS

**food:** what you eat and drink to keep you alive and to help you grow

**water:** transparent colourless liquid; we drink this and it is also found in lakes, rivers, seas, etc.

**diet:** what we eat and drink



## KEY WORDS

**biomolecule:** any molecule produced by a living organism, for example proteins, monosaccharides, lipids

**monosaccharides:** single-sugar carbohydrates

**glucose:** type of sugar the body uses for energy; a monosaccharide

**starch:** carbohydrate and a polysaccharide made up of many glucose units

**fibre:** important part of a healthy diet; it is not a nutrient and does not provide any calories or vitamins

**insoluble:** something which cannot be dissolved in a liquid

## 1 Food and nutrients

Food provides us with the nutrients necessary for our bodies to grow and carry out vital functions. These nutrients include **biomolecules** (sugars, lipids, proteins, vitamins) as well as minerals and water.

### Sugars (carbohydrates)

These are energy-giving substances found in many foods that we eat on a daily basis: bread, cereals, vegetables, pasta and potatoes.

There are two groups:

- **Simple sugars** have a sweet flavour and are crystalline and soluble in water. **Monosaccharides** belong to this group (these are used directly by our cells). They include **glucose** and the fructose present in honey and fruit. Disaccharides are also part of this group and are formed by two monosaccharides joined together. Our body separates them in order to use them. Sucrose in sugar and lactose in milk are examples of disaccharides.
- **Complex sugars** are neither sweet nor crystalline, but are made up of many simple sugar molecules joined together. For this reason, they must be broken down for our bodies to use them. Starch is the most important complex sugar in our diet. **Starch** is made up of glucose molecules. Cellulose, which makes up vegetable **fibre**, also belongs to this group, although it cannot be used as a source of energy.



### Lipids

These are a variety of very different substances which are **insoluble** in water and have an oily appearance, for example **oil** or **butter**. There are different groups within lipids:

- **Fats** are high-energy-giving molecules which, because of their chemical composition, are classified into:
  - **saturated fats:** usually from animals
  - **unsaturated fats:** almost always from vegetables and usually liquids, which is why they are called oils.
- **Membrane lipids** make up the membranes of cells and cell organelles.
- **Regulatory lipids** include some vitamins and hormones.



## Proteins

These nutrients are the most important structural molecules. They are formed by single molecules, called **amino acids**, joining together. Many animal products and some vegetables are rich in protein.

All proteins are made up of the same types of amino acids; what varies is the proportion and the order in which they combine.

To make proteins, the body uses amino acids which it can obtain from protein-rich food.

There are twenty amino acids in the body. Twelve of these are manufactured by the body itself from other amino acids, so these are found in our bodies even if they are not in our diet. The other eight amino acids, called **essential amino acids**, cannot be made by our body and must be obtained from the food we eat.

## Minerals

These are inorganic substances that have different functions in our body: some are structural, making up an important part of our bones and teeth, and others allow our organs to function correctly and intervene in the regulation of cell metabolism.

Minerals are present in variable quantities in all our food, especially in fruit and vegetables, and some of them are in the water we drink.

Common salt is vital for our development, although the **sodium** it contains can contribute to water retention in our body.

## KEY WORDS

**amino acid:** molecule which makes up proteins

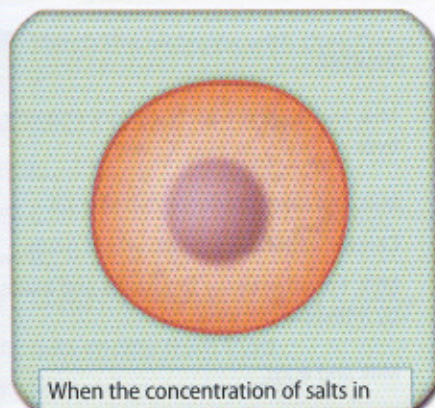
**sodium:** mineral which the body needs to regulate certain things, e.g. blood pressure; muscles and nerves also need sodium to develop properly

**osmosis:** movement of water through a membrane

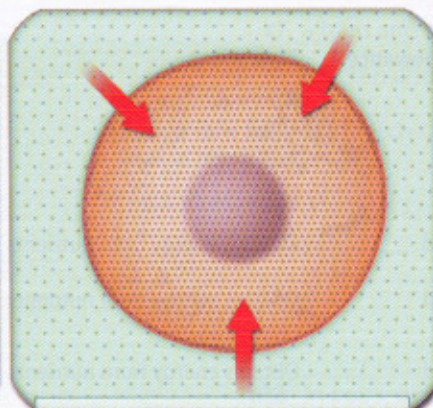
## Osmosis

The concentration of salts in our cells regulates the amount of water which comes in and goes out.

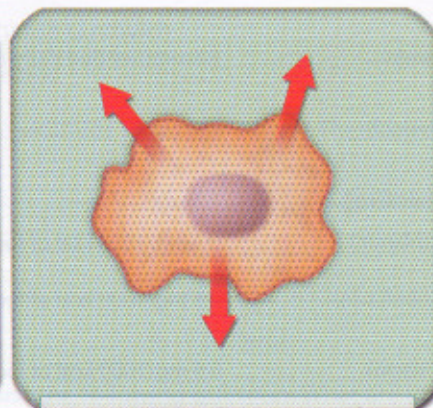
This process is called osmosis and is fundamental for the survival of cells in their environment.



When the concentration of salts in the external environment is the same as that inside a cell, movement of water out of the cell is balanced by the movement of water into the cell.



When the external environment has a lower salt concentration than the interior of the cell, water enters and the cell swells.



When the external environment has a higher concentration of salts than the interior of the cell, the water leaves and the cell shrinks.

## Activities

1 Answer the questions in your exercise book.

- How many amino acids exist in our bodies?
- How many of those amino acids can the body make from other amino acids?
- How do we obtain the other amino acids if our bodies can't make them?
- What do all proteins have in common?



## KEY WORDS

**solvent:** liquid that can dissolve other substances

**sweat:** clear, often salty, liquid produced by glands in the skin

**raw:** uncooked

## Water

Water is the most abundant molecule in our bodies (it makes up about 63% of our body mass).

It acts as a **solvent** for most of the other nutrients, which is vital for the body to carry out metabolic reactions. One of the functions of water is to act as a carrier for substances between different parts of the body. It is also used to regulate temperature.

We need to consume 2.5 litres of water a day. There is a balance between the amount of water we take in on a daily basis through our diet and the amount of water we eliminate through urine, breathing, **sweat** and faeces.

## Vitamins

These are substances of different chemical compositions, which are vital for the correct functioning of the body. They are needed in very small quantities but their absence causes different disorders and illnesses.

Vitamins are destroyed easily by heat, so they are only found in **raw** or slightly cooked food. Light and oxygen can destroy them too, so it is important to eat fresh food soon after buying it.

Vitamins can be classified as follows:

Liposoluble vitamins	Hydrosoluble vitamins
These are soluble in lipids, but insoluble in water. They accumulate in the liver, which acts as a store for these vitamins. Examples are vitamins A and D. Excessive doses of liposoluble vitamins can build up in fatty areas of the body and in the liver and can cause damage.	These are soluble in water, but insoluble in lipids. They don't accumulate in the body. Examples of these are: vitamins B <sub>1</sub> , B <sub>2</sub> , B <sub>12</sub> and C. An excess of hydrosoluble vitamins is not harmful, because they are expelled from the body through our urine.

Vitamin	Recommended daily allowance	Function	Sources
A (retinol)	750 µg	Antioxidant Helps with sight Keeps skin healthy	Milk and dairy products, carrots, egg yolk, liver
D (calciferol)	2.5 µg	Bone calcification	Milk and dairy products, cod liver oil
B <sub>1</sub> (thiamin)	0.4 mg/1000 kcal of food	Obtains energy from nutrients	Cereals, vegetables, yeast, wheat germ
B <sub>2</sub> (riboflavin)	0.6 mg/1000 kcal of food	Obtains energy from nutrients	Milk. Found in many foodstuffs and made by intestinal bacteria
B <sub>3</sub> (niacin)	6.6 mg/1000 kcal of food	Obtains energy from nutrients	Milk and eggs
B <sub>12</sub> (cyanocobalamin)	1.2 µg	Makes red blood cells	Eggs and meat Made by intestinal bacteria
C (ascorbic acid)	60 mg	Antioxidant Keeps the mucous membranes healthy	Citrus fruits, strawberries, vegetables


## Activities

2 Answer the questions in your exercise book.

- a) How much of our body mass is water?
- b) Why is water important for our bodies?
- c) How much water should we consume daily?
- d) Which bodily functions get rid of water?



## Activities

**3**  Copy the sentences into your exercise book. Listen and correct the wrong words.

- a) Saturated fats are usually from vegetable sources.
- b) Unsaturated fats are often solids.
- c) Fructose is a complex sugar.
- d) Complex sugars are sour.
- e) Fat is the most important sugar in our diet.
- f) Lipids are soluble in water.

**4** Answer the questions in your exercise book.

- a) What are proteins made of?
- b) How many of these are there in the body?
- c) Why are minerals important for our bodies?
- d) Where can you find minerals?
- e) What is the process called when water moves into or out of our cells?

**5**  Listen. Mark the main stress.

- a) sugar
- b) complex
- c) lipid
- d) saturated
- e) unsaturated
- f) protein

Now listen and repeat.

**6** Match the vitamins with their function.

- a) A
- b) D
- c) B<sub>12</sub>
- d) C
- e) B<sub>1</sub>
- 1. keeps mucous membranes healthy
- 2. gets energy from food
- 3. helps keep skin healthy
- 4. forms red blood cells
- 5. calcifies bones

**7** Copy and complete the sentences with a food or drink in your exercise book.

- a) Milk, \_\_\_\_\_ and liver are good sources of retinol.
- b) \_\_\_\_\_, vegetables and yeast are good sources of thiamin.
- c) Milk and \_\_\_\_\_ are good sources of niacin.
- d) Citrus fruit and \_\_\_\_\_ are good sources of ascorbic acid.

**8** Research the following topic and then write a short text about your findings.

What are isotonic drinks? What are they made of and why do people drink them?

**9** Match the food to the nutrients.


- a) starch
- b) oil
- c) honey
- d) butter
- 1. simple sugar
- 2. complex sugar
- 3. saturated fat
- 4. unsaturated fat

**10** Choose the correct words in the text. Read page 19 again and check your answers.

When the (a) *concentration* / *development* of salts in the (b) *external* / *internal* environment is (c) *different to* / *the same as* that inside a cell, movement of (d) *salts* / *water* out of the (e) *body* / *cell* is balanced by the movement of water (f) *into* / *out of* the cell.

**11** Classify the following foods in your exercise book. (1 = most vitamins, 4 = fewest vitamins)

- a) a tuna salad
- b) a chorizo sandwich
- c) a ham and cheese sandwich
- d) chicken and chips

**12**  Match the vitamins with their names. Then listen and check.

- |                   |                   |
|-------------------|-------------------|
| a) A              | 1. Cyanocobalamin |
| b) C              | 2. Riboflavin     |
| c) B <sub>1</sub> | 3. Ascorbic acid  |
| d) B <sub>2</sub> | 4. Calciferol     |

**13** In pairs, discuss the following question: What are the differences between full-fat milk and skimmed milk? In your opinion, which type of milk is better for you?

Use the words in the boxes to help you.

diet    help    less fat    more fat    overweight

recommended daily amount    taste    weight

**14** Research the following topic and then write a short text about your findings.

What are isotonic drinks? What are they made of and why do people drink them?



## KEY WORDS

**metabolic:** relating to the chemical processes by which cells produce the energy and substances necessary for life

**breathing:** process of air going in and out of the lungs

## 2 Nutritional needs

We need food to satisfy three types of needs: energetic, structural, and functional and regulatory.

### Energetic needs

To maintain the activity of all our cells, tissues and organs and do some physical activity our bodies need energy.

We obtain the energy we need from energy-giving nutrients (sugars and fats) and when these are lacking, also from proteins. This process happens as a result of **respiration**, which is a combination of chemical (**metabolic**) reactions that take place in cells.

Different nutrients have different calorific values:

- one gram of fat: 9 kcals
- one gram of sugars: 3.75 kcals
- one gram of protein: 4 kcals

Even when our bodies are resting, they need a minimal amount of energy. This is called the **basal metabolic rate** and is the energy required to keep our vital functions going: **breathing**, blood flow, etc.

The basal metabolic rate is measured after resting in one place with an average temperature (about 20 °C) and after not eating for 12 or more hours.

The value of the basal metabolic rate is expressed in kilocalories (kcal) per day and is different for different people. It depends on body mass, size, age and sex.

The daily basal metabolic rate can be calculated approximately like this:

#### Men

$$66.5 + [13.7 \times \text{body mass (kg)}] + [5 \times \text{height (cm)}] - [6.7 \times \text{age (years)}]$$

#### Women

$$55 + [9.5 \times \text{body mass (kg)}] + [4.8 \times \text{height (cm)}] - [4.7 \times \text{age (years)}]$$

To the basal rate we add the energy expended corresponding to the physical activity that has been done.

### Structural needs

As well as providing energy-giving nutrients, food also provides the body with essential substances to build and repair biological structures.

The most important **structural nutrients** are proteins, but some lipids also have this function.

### Functional and regulatory needs

Our body needs other kinds of nutrients like vitamins and some minerals in order to function properly. These ensure that metabolic reactions happen effectively, organs function normally and all parts of our body work well together.

Although our body needs less of these types of nutrients than the other types, they are still essential.

## Activities

15 Choose the correct verb form in each sentence: the infinitive or the *-ing* form. Copy the correct sentences into your exercise book.

- a) To maintain / Maintaining cell activity our bodies need energy.
- b) Basal metabolic rate is measured after to rest / resting.
- c) As well as to provide / providing energy-giving nutrients, food also provides essential substances to build and repair biological structures.
- d) In order for our body to function / functioning properly, it needs other nutrients like vitamins and minerals.



## Activities

- 16** Read the information below and then answer the questions in your exercise book.

A 40-year-old man and a 14-year-old girl have different basal metabolic rates.

- What does this difference mean?
- Which one of them has a higher basal metabolic rate? Why?

- 17** Copy the words below into your exercise book. Write the opposite of each word.

- soluble
- saturated
- intake
- swells

- 18** Complete the summary with the correct words from the box. Then listen and check.

crystalline   honey   fructose   lactose  
monosaccharides   soluble   sugar   sweet

Simple sugars have a (a) \_\_\_\_\_ taste, they are (b) \_\_\_\_\_ and they are (c) \_\_\_\_\_ in water. Examples of these are glucose and (d) \_\_\_\_\_ which are found in (e) \_\_\_\_\_ and fruit.

Disaccharides are formed by the combination of two (f) \_\_\_\_\_ and our body separates them in order to use them. Sucrose in (g) \_\_\_\_\_ and (h) \_\_\_\_\_ in milk are examples of these.

- 19** Answer the questions on proteins and minerals.

- What are the simple molecules which make proteins?
- What varies in proteins?
- What are minerals?
- What is the purpose of minerals in our body?
- What is one disadvantage of salt?

- 20** Answer the questions.

- When is the basal metabolic rate measured?
- What are two of the key factors when this rate is measured?
- Why is the basal metabolic rate not the same for everyone?
- Match the basal metabolic rates below to the correct person.
  - 1 200 kcals per day
  - 1 600 kcals per day
  - a 38-year-old man
  - a 16-year-old boy

- 21** In your exercise book, write three sentences describing the process of osmosis. Use the words in the boxes to help you.

cells   concentration   environment  
external   greater   less   salt  
shrink   swell   water

- 22** In pairs, look at the table below. Which of the options offers a balanced diet? Discuss with your partner and give reasons for your answer.

	Option A	Option B	Option C
Protein	50%	2%	12%
Carbohydrates	30%	28%	60%
Fats	20%	70%	28%

- 23** Copy and complete the table in your exercise book, using the information below.

- accumulate in the liver
- don't accumulate in the body
- not soluble in lipids
- not soluble in water
- vitamins A and D
- vitamins B<sub>1</sub>, B<sub>2</sub>, B<sub>12</sub> and C

Liposoluble vitamins	Hydrosoluble vitamins

- 24** Copy and complete the sentences with the present simple affirmative form of the verbs.

- Food \_\_\_\_\_ three types of needs in our body. (satisfy)
- Our bodies \_\_\_\_\_ energy to do physical activity. (need)
- Proteins \_\_\_\_\_ the most important structural nutrients. (be)
- Your body \_\_\_\_\_ energy to breathe and to keep your blood flowing. (use)
- Respiration \_\_\_\_\_ a combination of chemical reactions. (be)
- Essential substances in food \_\_\_\_\_ to repair biological structures. (help)



## KEY WORDS

**food intake:** quantity and type of food a person consumes

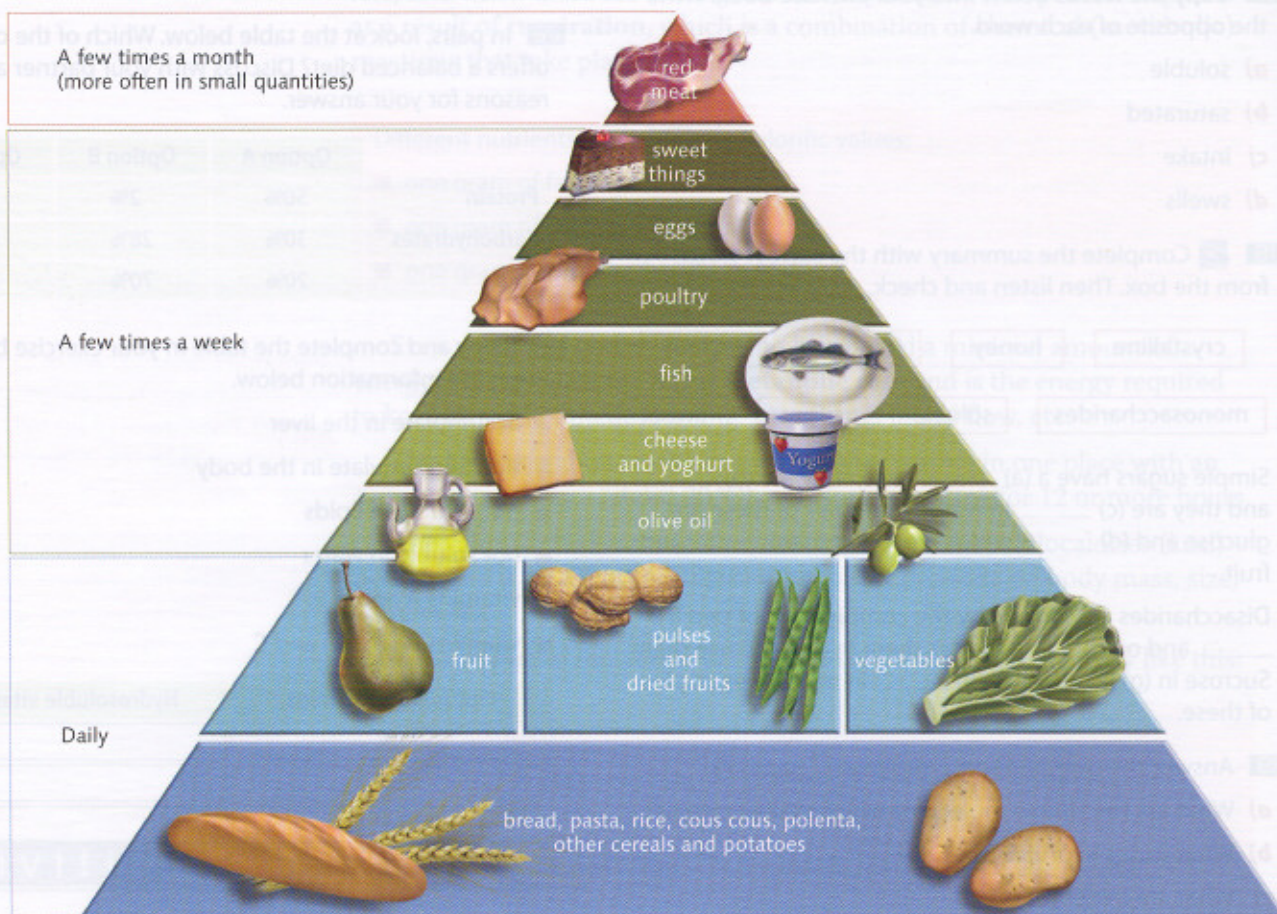
**nutrient:** essential dietary factor, for example carbohydrate, protein, fat, etc

## 3 Diets

Most types of foods contain different nutrients in different proportions. For this reason, you shouldn't eat all types of food in equal quantities or equally frequently.

The quantity and type of food a person consumes daily is called **food intake**.

This food pyramid is a summary of the recommended intake of different foodstuffs.

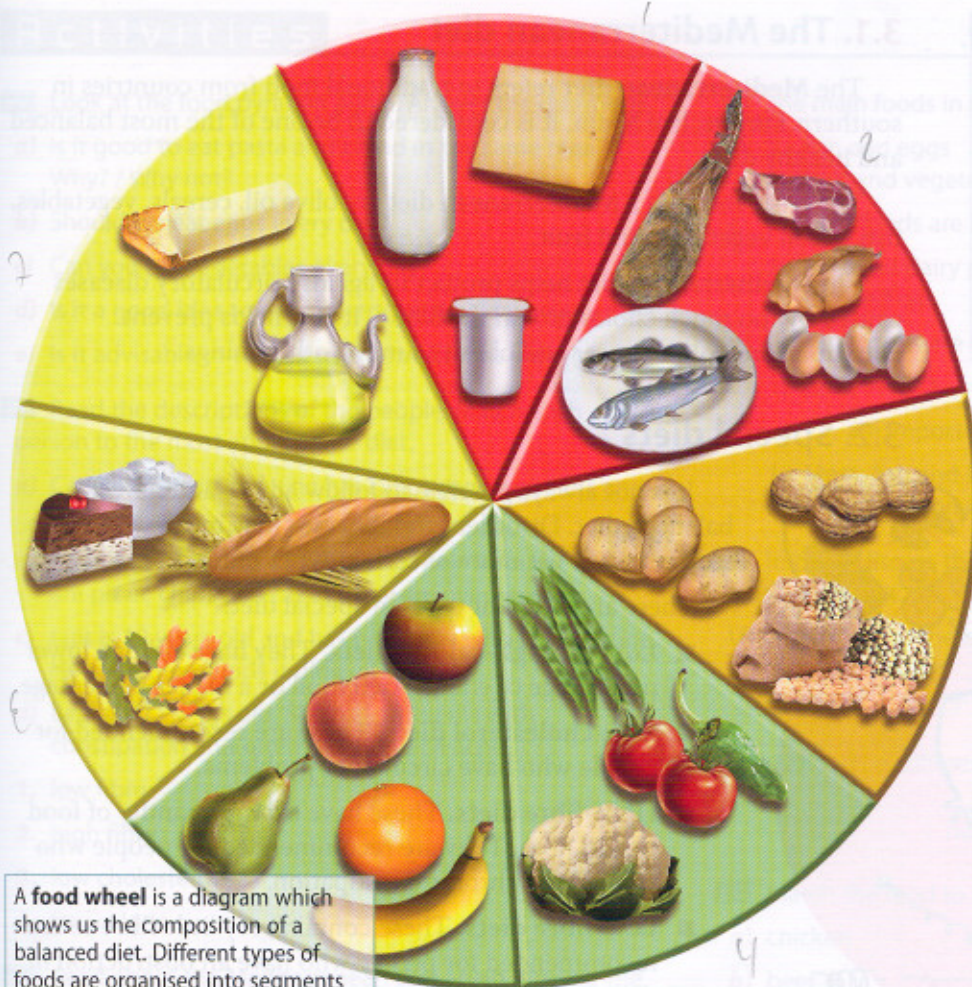


Food pyramid

Food is classified into seven groups, based on the types of **nutrients** it contains.

- **Group I:** milk and dairy products. Nutritional value: protein, fats, vitamins and minerals.
- **Group II:** meat, fish and eggs. Nutritional value: high in protein.
- **Group III:** pulses, root vegetables and dried fruits. Nutritional value: high in carbohydrates, minerals; also contain protein.
- **Group IV:** vegetables. Nutritional value: high in water, fibre, vitamins and minerals.
- **Group V:** fruit and derivatives. Nutritional value: high in water, fibre, vitamins and minerals.
- **Group VI:** cereals and derivatives and sugar. Nutritional value: rich in sugars; also contain protein and minerals.
- **Group VII:** fats and oils. Nutritional value: high in fats and liposoluble vitamins.





A **food wheel** is a diagram which shows us the composition of a balanced diet. Different types of foods are organised into segments according to the nutrients they provide and their function in the body.

- The red segments (1 and 2) include food that is rich in proteins, which have a wide range of functions.
- The orange segment (3), contains food which contain all the nutrients with energetic, structural and regulatory functions.
- The green segments (4 and 5) are made up of foods rich in vitamins and minerals with a regulatory function.
- Foods in the yellow segment (group 6 are those rich in carbohydrates and group 7, rich in lipids) have an energetic function.

### A balanced diet

For a diet to be healthy it also needs to be balanced. It must have all the necessary energy, structural and functional nutrients, and in the right quantities.

To have a balanced diet, you should follow this advice:

- eat a variety of different foods
- eat several times a day
- eat fresh vegetables
- avoid precooked and refined foods
- include unsaturated fats
- reduce your intake of foods rich in saturated fats and cholesterol
- consume fibre-rich foods every day.

### Activities

**25** Look at the food wheel. Copy and complete the sentences in your exercise book.

- a)** Meat, fish and \_\_\_\_\_ are rich in protein.
- b)** Fats and oils are in group \_\_\_\_\_.
- c)** Fruit and vegetables are high in \_\_\_\_\_.
- d)** Milk and \_\_\_\_\_ are high in protein.
- e)** \_\_\_\_\_ contain sugars, protein and minerals.



## KEY WORDS

**constipation:** difficult or infrequent bowel movements

**colon:** last part of the digestive system; it extracts water and salt from solid waste

**wasting:** one of the causes of severe malnutrition, when muscle and fat tissue waste away

### 3.1. The Mediterranean diet

The **Mediterranean diet** refers to traditional food from countries in southern Europe, like Spain. It is considered to be one of the most balanced and healthy diets.

The basic foods in a Mediterranean diet are olive oil, cereals, vegetables, fish, green vegetables and fruit.

The Mediterranean diet helps protect us against circulatory diseases caused by too much cholesterol in the blood. It also helps prevent **constipation**, **colon** cancer and obesity, among other things.

### 3.2. Special diets

It is not always possible to follow advice and have a balanced diet. Disorders and illnesses may mean we have to stop eating or eat more of certain types of food.

There are different types of special diet:

- **Low- or high-calorie diets.** They have either a lower percentage of energy-rich food or a higher percentage.
- **Low-cholesterol diets.** These are recommended for people who have circulatory problems.
- **High-fibre diets.** These have a large quantity of food rich in fibre. They are recommended for people who suffer from chronic constipation.
- **Low-fibre diets.** These contain very little fibre so are recommended for people who have an obstruction in their intestines or slow intestinal movements.



### 3.3. Inadequate diets

An inadequate diet can cause changes in the body and illnesses, which can be serious or even fatal. It is important to distinguish malnutrition from incorrect nutrition.

#### Malnutrition

This occurs when the quantity of food eaten is not enough to satisfy the body's nutritional needs. Different types of malnutrition include **wasting**, which happens when there is a total lack of food, and **kwashiorkor**, which is caused by a serious lack of protein in the diet.

#### Incorrect nutrition

This refers to eating certain types of food, which are not good for us. It can lead to illnesses like obesity, circulatory problems, certain types of cancer and deficiency diseases.

## Activities

26 Copy the foods below into your exercise book. Listen and tick the foods you hear. Which diet is the doctor talking about?

- |            |                 |           |             |
|------------|-----------------|-----------|-------------|
| • red meat | • vegetable oil | • chicken | • potatoes  |
| • fish     | • nuts          | • fruit   | • olive oil |



## Activities

**27** Look at the food pyramid again. Answer the questions.

- Is it good to eat pasta and bread in the same meal? Why? / Why not?
- Should we eat eggs every day?
- Can you eat vegetables every day?
- Is it a good idea to eat a pastry for breakfast every day?
- Is it advisable to eat red meat three times a day?

**28** Read the descriptions of the people. Match each person to the most appropriate diet.

- Carla is 35 years old. She has circulatory problems and is often ill.
  - Juan and Jaime are 25 years old. Their favourite foods are pizza, chips and cakes. They are overweight.
  - Luis is 19 years old and has problems with his intestine. He sometimes finds it difficult to eat.
  - Beata is 71 years old. She has problems with constipation and often has stomach ache.
- low fibre
  - high fibre
  - low cholesterol
  - low calorie

**29** Read about the Mediterranean diet again. Answer the questions. Give reasons for your answers.

- Why is it a balanced diet?
- Why does it help reduce the risk of constipation?
- Does the Mediterranean diet help reduce the risk of obesity? Why?
- Does the Mediterranean diet help reduce the risk of circulatory problems?
- Which of the following meals would be appropriate in the Mediterranean diet?
  - A paella and a salad
  - A hamburger and chips

**30** Research the following topic and write a short text (50–100 words) about it in your exercise book.

Vitamin deficiencies cause different problems for different people. Discuss the different problems, their causes and the consequences for people's health.

**31** Make a food diary for a week. Compare it with the food pyramid and with your friends. How healthy is your diet?

**32** Listen to the food nutritionist. Choose the correct answers.

- There are \_\_\_\_\_ food groups.
  - 7
  - 6
  - 8

**b)** The main foods in group 1 are \_\_\_\_\_.

- fish and eggs
- milk and dairy products
- fruit and vegetables

**c)** Group 7 foods are high in \_\_\_\_\_.

- milk and dairy products
- cereals and sugars
- fats and oils

**d)** Group 2 foods are high in \_\_\_\_\_.

- protein
- minerals
- water

**e)** \_\_\_\_\_ are important foods in group 2.

- Meat, fish and fruit
- Fish, cheese and eggs
- Meat, fish and eggs

**33** In pairs, discuss the following question: 'A varied diet is a balanced diet.'

Use the words in the box to help you.

- |                 |             |           |              |
|-----------------|-------------|-----------|--------------|
| agree           | disagree    | important | healthy      |
| weight          | differences | cook      | times of day |
| number of meals |             |           |              |

**34** Match the food to the food type.

- |                           |                          |
|---------------------------|--------------------------|
| <b>a)</b> chicken         | <b>1.</b> red meat       |
| <b>b)</b> beef            | <b>2.</b> carbohydrates  |
| <b>c)</b> cheese          | <b>3.</b> poultry        |
| <b>d)</b> bread and pasta | <b>4.</b> dairy products |

**35** Look at the food pyramid again. How often should you eat the following types of food? Listen and choose the correct answer.

- red meat
  - every day.
  - once a week.
  - a few times a month
- rice and couscous
  - every day.
  - once a week.
  - once a month
- fish
  - once a week.
  - more than once a week.
  - once a month

**36** Read about the different kinds of diets below. In your exercise book, write the name of each diet.

- These diets are good for people who suffer from constipation.
- These diets are good for people with intestinal problems.
- These diets do not have a lot of high-energy food.
- These diets are good for people with circulatory problems.



## KEY WORDS

**preservation:** process to preserve food to make it last longer

**enzyme:** protein that increases the rate of a chemical reaction

**rotten:** in a bad, putrid state

**organoleptic:** refers to the properties of food: its taste, colour, smell and feel

**freeze-dried:** dehydration process used to preserve foodstuffs

**sublimation:** process of a solid becoming a gas without being a liquid in between

## 4 Food preservation and hygiene

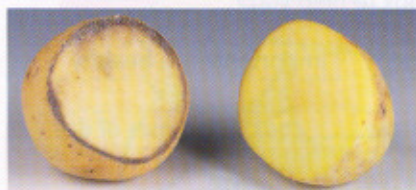
Foods are made up of organic molecules which decompose in time and make them inedible. For this reason, if foods are not going to be consumed quickly they are **preserved**. Food preservation makes it easier to store foods.

One of the main principles behind food preservation is to stop food decomposing. Decomposition is caused by:

- the action of **enzymes** in the food which can change the product
- the multiplication of micro-organisms, which make the food decompose and can produce toxic substances that then enter the food.

You should never eat **rotten** food; the **organoleptic** properties as well as the nutrients will have changed.

The main methods of preserving food are: cold, heat, drying, vacuum packing, irradiation, fermentation, smoking and the use of preservatives.



### Cold

This is a very effective way of preserving food. Low temperatures reduce the speed at which micro-organisms reproduce and the action of enzymes. There are three types:

- **Refrigeration.** The temperature is maintained only a few degrees above  $0^{\circ}\text{C}$ .
- **Freezing.** The temperature is below  $0^{\circ}\text{C}$  and reaches  $-18^{\circ}\text{C}$ .
- **Deep freezing.** The temperature varies between  $-35^{\circ}\text{C}$  and  $-150^{\circ}\text{C}$ .

### Heat

Heat destroys enzymes and kills micro-organisms. Depending on the intensity, there are three different methods:

- **Sterilisation.** This gets rid of all the micro-organisms; the food is subjected to temperatures between  $110^{\circ}\text{C}$  and  $120^{\circ}\text{C}$ .
- **UHT (ultra high temperature).** Food is heated to a very high temperature ( $135^{\circ}\text{C}$ ) for a few seconds. This destroys all the micro-organisms but not the nutrients.
- **Pasteurisation.** This applies a temperature of about  $72^{\circ}\text{C}$  for 15 seconds followed by a rapid cooling down. This kills the micro-organisms but does not change the organoleptic properties of the food.

### Drying

This process involves eliminating the water in foods to stop or delay decomposition. **Freeze-drying** is a commonly used method: a food is frozen and then thawed by high-pressure **sublimation**.



Dissolvable coffee, granules are made by freeze-drying.

## Activities

37 Answer the questions.

- Why are foods perishable?
- Which parts of food decompose?



## Vacuum packing

This system removes the air and therefore the oxygen so that **aerobic** micro-organisms cannot survive and many enzyme reactions cannot take place.

## Irradiation

Certain food products are subjected to **radiation**. This destroys the enzymes and the micro-organisms.

## Fermentation

Some foods can change because of the action of specific micro-organisms through **fermentation**. Other products can be preserved better and can acquire new nutritional qualities. Examples of fermented foods are cheese and yoghurt.

## Smoking

Wood smoke contains substances that kill micro-organisms and stop food deteriorating, mainly because of the reduction in the quantity of water which occurs during the process.

## Use of preservatives

The use of large quantities of **sugar** and **salt** in food help to preserve it because of the loss of water inside the micro-organisms. This is why cod, which in its natural state would decompose rapidly, can be kept at room temperature for a long time once it has been preserved in salt. Jams and conserves are examples of preservation using sugar.

**Vinegar** and **spices** are also good for preserving food because they stop the spread of micro-organisms.



## KEY WORDS

**aerobic:** something that needs oxygen

**radiation:** energy that travels as waves or as high-speed particles

**fermentation:** food preservation process in which carbohydrates are converted using, for example, yeast

## Additives

Additives are natural or artificial chemical products that are added to food for different purposes. Here are some examples:

Additive	Function
Preservatives	Prolong the life of food.
Colourings	Make food look more attractive for the consumer.
Flavour enhancers	Improve the flavour of food.
Stabilisers	Maintain the texture of food and how it looks.
Antioxidants	Prevent oxidative changes in food.
Sweeteners	Give food a sweet taste; they may be sugars or artificial sweeteners; the latter are used in diet food and drinks because they have no calories.

We still don't know what effects many food additives can have on our bodies. According to some scientists, excessive or indiscriminate use of certain additives can damage your health.

## Activities

**38** Read about additives again. Answer the questions.

- What do preservatives do?
- What do colourings do?
- In which products are you likely to find sweeteners?
- What do sweeteners do?



## KEY WORDS

**consumer:** someone who buys a product

**liability:** legal responsibility for causing damage or injury

## Food labelling

**Consumers** have a right to know certain information about the foods they buy. Food companies are obliged by law to inform us about their products on the label. The label is a guarantee of safety and must contain, at least, the following information:

- the name of the product
- the quantity of the product (its weight or volume)
- the amount of each ingredient in decreasing order by weight or volume
- instructions for use, if necessary
- nutritional information
- how to store it
- best-before date: manufacturers guarantee the product until this date
- expiry date (if the food is perishable): after this date it could be dangerous to eat the food
- name of the company

### 4.1. Food hygiene

Before food reaches the consumer it usually goes through a series of processes. These processes are collectively known as the **food chain**. They are as follows: production, storage, transport, the industrial chain and marketing. All of these stages must comply with a series of hygiene procedures.

To avoid micro-organisms developing in foodstuffs all of the processes must be clean and hygienic. It is important that people working in this environment do not have infectious diseases and that their own personal hygiene is good. They must make sure that food products do not come into contact with animals.

The law establishes hygiene regulations for people handling food, company **liability** and monitoring procedures to ensure these regulations are followed.



Food handlers have a vital role in the healthiness of our food.

## Activities

**39** Copy the words below into your exercise book. Put these food processing stages in order in which they occur. (1 = first, 5 = last)

- a) transport
- b) marketing
- c) production
- d) industrial chain
- e) storage

Now listen and check your answers.



## Activities

**40**  Listen. Mark the main stress on these words.

- a)** nutrients
- b)** freezing
- c)** sterilisation
- d)** pasteurisation
- e)** high-pressure

Now listen and repeat.

**41** In your exercise book, write down four things a food manufacturer must include on a product label.

**42** Answer the questions.


- a)** Why don't uncooked lentils and rice need to be refrigerated?
- b)** Why do you think removing the water through freeze-drying stops food rotting?
- c)** Do you think that micro-organisms in food always make food rot and make it inedible?

**43** Copy and complete the missing words.

- a)** preserve (verb) – \_\_\_\_\_ (noun)
- b)** \_\_\_\_\_ (verb) – frozen (adjective)
- c)** \_\_\_\_\_ (verb) – hot (adjective)
- d)** dry (verb) – \_\_\_\_\_ (adjective)
- e)** colour (noun) – \_\_\_\_\_ (adjective)

**44** Read the descriptions of food preservation below. In your exercise book, write the name of the process for each description.

- a)** It uses temperatures between  $-35^{\circ}\text{C}$  and  $-150^{\circ}\text{C}$ .
- b)** It applies a temperature of about  $72^{\circ}\text{C}$  for 15 seconds and then cools the product down quickly.
- c)** It freezes food and then thaws it using high-pressure sublimation.
- d)** The substances produced in this process reduce the amount of water in food. This eliminates the micro-organisms and stops food deteriorating.

**45**  Copy the summary into your exercise book. Listen and choose the correct words. Which process is it describing?

This process is often used for (a) *cheese / milk*. The product is (b) *cooled down / heated* for a few (c) *seconds / hours* to a very (d) *low / high* temperature, (e)  $135^{\circ}\text{C} / 35^{\circ}\text{C}$ . This process destroys the (f) *micro-organisms / nutrients*, but not the (g) *micro-organisms / nutrients*.

**46** In pairs, look at this food label. According to what you have learned in this section, is this information correct? Why? Why not? Give reasons for your answers.

Energy (per 100 g)	97 kJ
Nutritional value (per 100 g)	6.3 g of protein
	6.0 g of carbohydrates
	2.5 g of fats

**47** Copy the list below into your exercise book. Tick the additives.

- ☐ minerals
- ☐ sugars
- ☐ flavour enhancers
- ☐ fats
- ☐ sweeteners
- ☐ carbohydrates
- ☐ colourings
- ☐ preservatives

**48** Read the following information about milk. Then answer the questions.

Sterilised milk in a carton can be kept unrefrigerated for some time if the carton has not been opened. However, pasteurised milk in bottles must be kept in a fridge, even if it has not been opened.

- a)** What is the difference between pasteurized and sterilised milk?
- b)** Why can sterilised milk be kept out of a fridge if it is not open?
- c)** Which type of milk do you drink? Do you prefer pasteurised or sterilised milk?

**49** In pairs, discuss the following statement. Use the phrases below to help you.

'Synthetic food colourings are useless and simply trick the consumer. They have no place in food products as they do not add anything to a product except to make it look nicer. Additives should be banned.'

*I agree / I disagree because ...*

*Some of the advantages / disadvantages are ...*

*Some people might ...*

*Manufacturers should / shouldn't ... because ...*

*The law should / shouldn't ... because ...*

**50** Read about food preservation methods again. Which methods are best for these foods?

- a)** Serrano ham
- b)** strawberry jam
- c)** chicken breasts
- d)** chorizo
- e)** mackerel



## KEY WORDS

**developed countries:** countries that tend to have high standards of living and high levels of material wealth

**diabetes:** disease that means the body does not produce enough insulin and has a high blood sugar count

**developing countries:** countries that tend to have lower standards of living and lower levels of material wealth

**food poisoning:** illness caused by eating food that contains harmful bacteria

## 5 Dietary habits

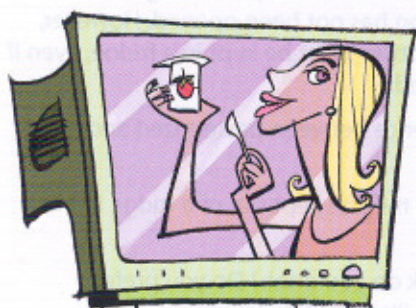
For historical, cultural, social and even religious reasons, dietary habits are different all over the world.

In many **developed countries**, for example, nutritional imbalance is common. Illnesses linked to nutrition as a result of an inappropriate diet are also common. These are characterised as follows:

- A very high calorie intake which can lead to obesity and certain type of **diabetes**.
- Foods rich in cholesterol and saturated fats increase the risk of circulatory problems.
- An excess of refined foods with little waste can cause problems like constipation due to a lack of fibre in the diet.
- Too much protein-rich food can lead to an excess of amino acids, which must then be processed by the liver and the kidneys, which in turn puts extra stress on those organs.
- Eating processed meals can lead to an excess of additives, which can damage your health.

In **developing countries**, the diet is not always adequate, but for different reasons:

- Diets tend to be low in calories so, at times, the body does not get enough energy.
- Diets are often monotonous and because of the lack of variety of food, the body lacks vital vitamins.
- Protein intake tends to be poor. Food that contains protein is scarce and is more expensive to produce.
- Sanitary conditions during the handling and preserving of food are often poor. This can lead to infectious diseases and **food poisoning**.



### 5.1. Genetically modified food

New foods can now be made by applying **genetic techniques**. This process involves introducing genes from one organism into another type in order to change the other type's genes and improve the food it produces. The result is genetically modified organisms. The food obtained from these modified organisms is called **genetically modified food**.

#### Advantages

- Cheaper to produce; not as many pesticides or similar products required (this benefits the environment too)
- More profitable; more resistant to frost, drought, illness and plague
- In some cases, genetic modifications in food products introduce higher-quality nutrients than in the original product

#### Disadvantages

- Some new components of these products could cause allergies
- Toxic or even carcinogenic products could appear in these products
- Critics think that, long term, these products could have an effect on our own genes
- There is a risk that genetically modified organisms could invade places inhabited by other living beings and lead to their extinction

Research is being conducted into genetically modified foods to ensure that they are completely safe for consumption.




## Activities

**51** Are the following problems more likely to occur in developed or developing countries? Copy and complete the table in your exercise book.

- diabetes
- lack of energy
- infectious diseases
- kidney and liver problems
- food poisoning
- low protein intake
- circulatory problems

Developed countries	Developing countries

**52**  Copy the words below into your exercise book. Listen. Tick the genetically modified food you hear.

- tomatoes
- papaya
- bananas
- rice
- melons
- apples
- corn

**53** In pairs, discuss the following statement. Give reasons for your answers.

'Diets in developing countries are better for people than those in developed countries.'

**54** Research diabetes and write a short text to explain your findings.

Think about the following:


- What is diabetes?
- Are there different types of diabetes?
- What causes diabetes?
- Can diet affect people with diabetes?
- Can a certain type of diet cause diabetes?
- Are some people born with diabetes?
- What is the treatment for diabetes?
- It is more common in children, adults or old people?
- How common is diabetes in your country?

**55** Are the sentences below advantages (A) or disadvantages (D) of genetically modified food?

Copy and classify the reasons in your exercise book.

- a)** They are more profitable.
- b)** They may have toxic or carcinogenic products in them.
- c)** They do not need as many pesticides, which results in a benefit for the environment.
- d)** They may cause allergies.
- e)** The crops are more resistant to frost and drought.
- f)** They might interfere with our own genes.

**56** Name one advantage and one disadvantage of genetically modified food.

**57**  Solve the anagrams at the end of each sentence.

Copy and complete the sentences in your exercise book.

- a)** High-calorie diets can cause \_\_\_\_\_. (tobyesi)
- b)** Too much cholesterol can cause \_\_\_\_\_ problems. (royalicrut)
- c)** Too many amino acids can cause problems for the liver and \_\_\_\_\_. (dekyins)
- d)** \_\_\_\_\_ can be bad for your health. (viesdatid)

Listen and check.

**58** Complete the sentences with the -ing form of the verbs.

- a)** \_\_\_\_\_ prepared meals can lead to an excess of additives. (eat)
- b)** Genetic techniques involve \_\_\_\_\_ genes from one organism into another. (introduce)
- c)** It is important to have good sanitary conditions when \_\_\_\_\_ food. (handle)
- d)** New foods can now be made by \_\_\_\_\_ genetic techniques. (apply)
- e)** \_\_\_\_\_ food must be done carefully to avoid hygiene problems. (preserve)
- f)** \_\_\_\_\_ an excess of amino acids can cause problems for the liver and kidneys. (process)

**59** Read the statement below. Do you agree or disagree with this view?

Write a short text to justify your answer and give an example of how each of the areas mentioned affects our food preferences and dietary habits.

Compare your answers with a partner.

'Food preferences and dietary habits are due to culture, religion, social class, age, education, health and social environment.'



# Revision activities

- 1 Look at the food in the photo and answer the questions.



- Which nutrients are abundant in fruit?
- Which food group does fruit belong to?
- Which diets recommend eating fruit?
- Which nutritional need do they satisfy?
- Could eating these in excess damage our health?

- 2 Match the food with the type of food.

- |           |                     |
|-----------|---------------------|
| a) jam    | 1. saturated fats   |
| b) fish   | 2. unsaturated fats |
| c) oil    | 3. protein          |
| d) butter | 4. sugar            |

Now listen and check.

- 3 A person needs to have a diet with 2 400 calories a day. Here is the distribution of each nutrient in that diet:

	Sugars (g)	Lipids (g)	Protein (g)	Calories
Breakfast		6	16	300
Lunch	130	45		950
Snack	18	8	20	
Evening meal	60		25	

Copy and complete the table with the missing numbers in your exercise book.

- 4 Read the following information then answer the questions. Write the answers in your exercise book.

**Name:** Luis Blanco  
**Age:** 55 years old  
**Job:** Company director  
**Symptoms:** Breathing difficulties; pain in left-hand side of chest  
**Diet:** Luis is a very busy man and does not eat regular meals; he eats a lot of burgers, chips, fast food, fatty foods and cakes every day. He does not eat much fruit or fresh vegetables.  
**Blood pressure:** 150/120; High  
**Cholesterol level:** 240 mg/DL; High

- How old is Luis?
- What does he do?
- What are his symptoms?
- What are his blood pressure and cholesterol levels?
- Is his diet healthy? Why? Why not?

Now imagine you are the doctor Luis has come to see. What will you advise him to do? Why?

- 5 In pairs, practise the conversation between Luis and the doctor using the information in Activity 4. Use the phrases below to help you. Then act it out for the class.

**Luis**

*I'm feeling ...*

*I'm very busy ...*

*I don't have time ...*

*I would like to ...*

**Doctor**

*You must / mustn't ...*

*You should / shouldn't ...*

*You are in danger of ...*

*Your diet is ...*

*Your blood pressure / cholesterol is too high / too low ...*

- 6 The list below shows the nutrients in an ideal diet for an adult. Why is this ideal? Discuss your answer with a partner.

- Carbohydrates: 60%
- Lipids: 30%
- Protein: 10%

- 7 Look at the two diets below. Why are they not balanced? Change round the percentages and write the correct tables in your exercise books.

Diet A	%
Meat	50
Fish	20
Eggs	20
Bread	5
Fruit	5

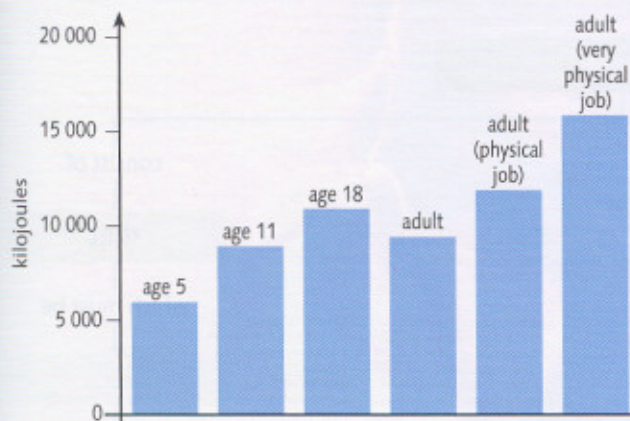
Diet B	%
Meat	10
Fish	30
Fats and oils	50
Bread	5
Fruit	5



# Revision activities

## Development of basic competences

The natural science teacher has given Carlos and Nuria (two 15-year-olds) the following graph:



Energy requirements by age and occupation

Officially, the energy value of the food should appear, expressed in kilojoules, on all food labels. However, it is often expressed in other ways, like calories or kilocalories. This can be confusing so Carlos and Nuria try to clarify this by looking on the Internet. They find the following information:

There are two different types of calories:

- **Calorie-gram.** This shows the calorific energy necessary to increase the temperature of one gram of water by one degree celsius. We use the symbol cal (with lower case) and it is equivalent to 4.1876 J (joules).
- **Calorie-kilogram.** This represents the energy needed to increase the temperature of one kilogram of water by one degree celsius. This definition corresponds to kilocalories, which are the equivalent of 4,1876 kJ (kilojoules). This calorie used to be used in biology, medicine and nutrition and we use the symbol Cal (with a capital C). Later, to avoid confusion, it was called kcal (kilocalorie).'

In this graph, the energy is expressed as kilojoules but you are probably more familiar with kilocalories as this is what nutritionists usually use.

- 1 How many kilocalories are each of the energy levels equivalent to on the graph?
- 2 How many kilocalories are there in the glass of milk? Which percentage represents the amount of energy required daily?

Nuria has a 5-year-old sister who doesn't eat very much. She drinks full-fat milk (the same one as Carlos) for breakfast.

- 3 Does a 38-year-old adult who works in an office have to consume the same amount of energy as an 18-year-old student? Give reasons for your answer.

Carlos drinks a 200 ml glass of full-fat milk every morning. Here is the label for the milk:

### NUTRITIONAL VALUE

#### VALUES PER 100 ML

Energy	63 kcal (264 kJ)
Protein	3.1 g
Carbohydrates	4.6 g
of which sugars	4.6 g
Fats	3.6 g
of which saturated	2.4 g
Fibre	0 g
Salt	0.04 g
Calcium	120 mg (15% RDA)

- 4 How much milk should Nuria's sister drink to consume the amount of kilojoules of energy necessary for her age?

Carlos's father, who wants to get rid of his fat belly, drinks the same brand of milk, but he drinks skimmed (desnatada) milk.

### NUTRITIONAL VALUE

#### VALUES PER 100 ML

Energy	34 kcal (144 kJ)
Protein	3.2 g
Carbohydrates	4.7 g
of which sugars	4.7 g
Fats	0.25 g
of which saturated	0.2 g
Fibre	0 g
Salt	0.04 g
Calcium	120 mg (15% RDA)
Vitamin A	120 µg (15% RDA)
Vitamin B	0.75 µg (15% RDA)

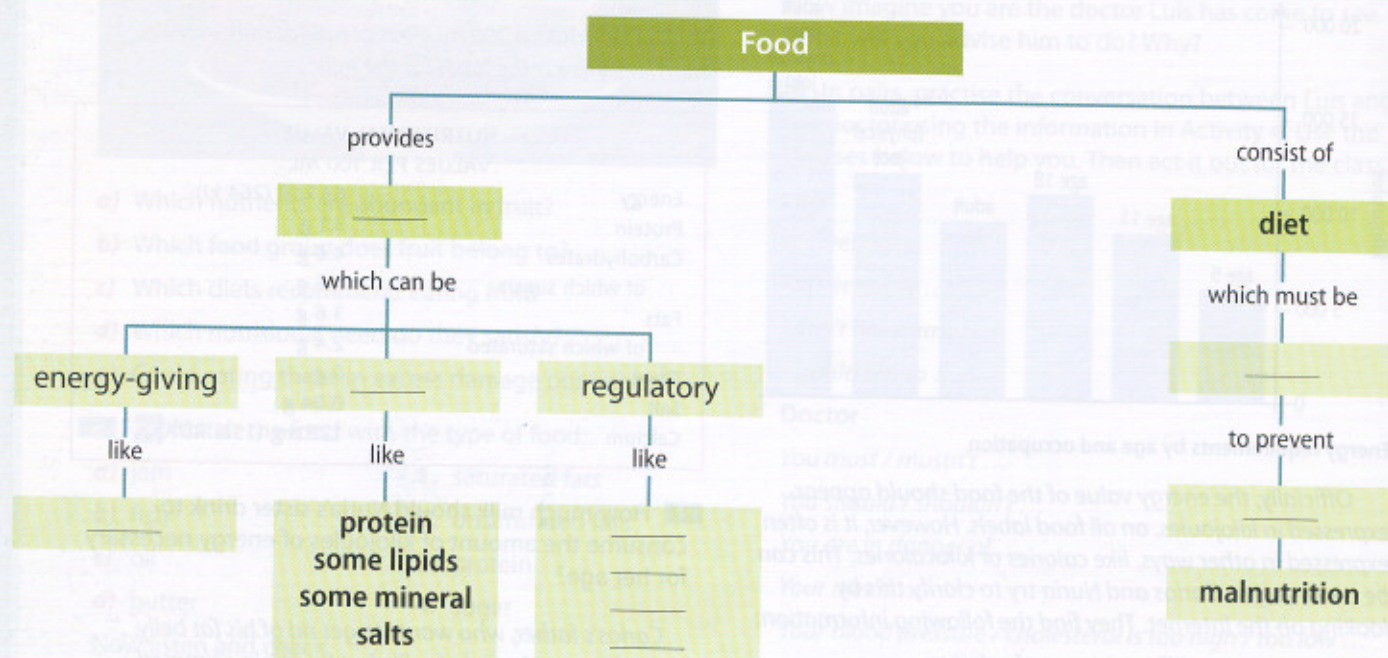
- 5 Compare the labels. What are the main parts of full-fat milk that make up the energy content?
- 6 Skimmed milk has less energy than full-fat milk; it is a low-calorie food. What are the main parts of skimmed milk which make up the energy content?
- 7 Full-fat milk also contains vitamins A and D but they do not appear on the label because they belong to one of the groups of nutrients that are already present in the milk. In which group of nutrients would these two vitamins be included?



# Unit summary

## Food and nutrition

In your exercise book, copy and complete the chart with the words below.



- balanced
- fats
- sugars
- illnesses
- mineral salts
- nutrients
- structural
- vitamins